

ECOLOGY

Appraising U.K. Ecosystems, Report Envisions Greener Horizon

A group of 500 scientists has just released the first-ever assessment* of the status of ecosystems in the United Kingdom, evaluating their ability to provide food, sustain biodiversity, and perform many other services. The overall conclusion: Some 30% of these ecosystem functions are currently declining. The report suggests that the government could do a better job managing these ecosystems and reap more benefits for society if it took into account the economic value of a broader array of natural benefits, such as recreation and carbon sequestration.

In the most comprehensive attempt yet, the report calculates the economic values of several benefits across an entire nation. The analysis is the best of its kind and a step toward ecosystem accounting, says Robert Scholes, a systems ecologist with the Council for Scientific and Industrial Research in Pretoria, South Africa, who was not involved in the study.

The new report is modeled on the global Millennium Ecosystem Assessment, which highlighted the parlous state of ecosystems worldwide and emphasized the importance of the benefits they provide (*Science*, 1 April 2005, p. 41). During a 2007 review of the U.K. environmental policy, a House of Commons environmental committee called for a similar national assessment. About half the £1.3 million funding came from the Department for the Environment, Food and Rural Affairs (DEFRA), with the remainder coming from other environmental agencies. The effort was co-led by Robert Watson, DEFRA's science adviser and one of the architects of the Millennium Assessment.

For 2 years, a team of more than 500 experts evaluated the status of 25 ecosystem services within eight broad habitat types, such as cities, farms, and woodlands. The results were mixed. On important indicators we continue to move down an unsustainable path, despite some improvements, Scholes says. A third of services are declining, such as soil quality. Many others, like water quality in streams and wetlands, are stable but remain degraded. On the other hand, farm yields have increased dramatically since 1945. The capacity of ecosystems to pro-

vide several services has recovered in recent decades, including air quality, due in part to environmental regulations. Some improvements in ecosystem function, however, come at the expense of other nations: The United Kingdom imports 30% of its food and 80% of its timber, which means the associated ecosystem degradation is happening outside U.K. borders.

To better inform policymakers, the authors went a step further than did the Millennium Assessment and gauged the economic value of several ecosystem services.



Another path. Including more values of nature, such as recreation, can better inform land-use policy.

This is easy for crops and timber, which fetch a market price, but can be more difficult and time-consuming for so-called nonmarket values of nature, such as aesthetic pleasure or biodiversity. It's superhard to do so that you would believe the numbers at a national level, says economist Stephen Polasky of the University of Minnesota, Twin Cities, who advised the project.

The team combed through the scientific literature and also conducted original analyses. Charles Perring of Arizona State University in Tempe describes the effort as a nice, rather conservative, traditional

approach to ecosystem service accounting. They found, for example, that inland wetlands improve water quality to the tune of £1.5 billion per year. Access to rivers, coasts, and wetlands is worth up to £1.3 billion annually. The calculations, some done to a square-kilometer resolution, show that location matters a lot; woodlands near cities offer a larger sum of recreational benefits than those more distant. We should have forests around British cities, says Ian Bateman of the University of East Anglia, who led the economic analysis.

The core of the economic analysis centered on six scenarios of what U.K. ecosystems might look like in 2060, given various policy decisions. For example, in the World Markets scenario, the government boosts agricultural production and eases regulations. By contrast, in the Nature@work scenario, officials encourage the cultivation of landscapes that balance a variety of needs from timber to hiking.

A key point that emerged was the importance of including nonmarket values in policy decisions. When only agricultural output was considered, the World Markets scenario offered the second greatest economic benefits among the six scenarios, and Nature@work was dead last (because it lessens the amount and intensity of agriculture). However, the tables were turned when the economic value of countryside recreation, urban greenspace, and greenhouse gas emissions were monetized. Nature@work offered the largest benefits and World Markets the smallest. It's a radical change in the prioritization of the best way forward, Bateman says.

Co-chair Steve Albon of the James Hutton Institute in Aberdeen, United Kingdom, notes that the team deliberately avoided policy prescriptions: Our view is that this needs to be a more participatory approach not only with government but the wider stakeholder community, too. As for the report's impact, many observers are encouraged by the fact that the government itself commissioned the report rather than, say, a nonprofit with limited clout which increases the odds that its messages will be heard and data sets used.

Despite progress on monetizing the value of outdoor recreation and urban greenspace, much research is needed to estimate the economic value of other nonmarket ecosystem benefits such as added value of wild pollinators for crops. Leaving them out will lead to bad decisions, Polasky says. But routinely including them in decision-making will require a lot more work.

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*UK National Ecosystem Assessment (2011), Synthesis of the Key Findings, UNEP-WCMC, Cambridge.